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UNIVERSAL SERVER FARM MASS CUSTOM DESIGN TOOL

BACKGROUND OF THE INVENTION

5 **1. Technical Field:**

The present invention relates generally to computer software and, more specifically to designing server configurations.

10 **2. Description of Related Art:**

The Internet, also referred to as an "internetwork", is a set of computer networks, possibly dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from a protocol of the sending network to a protocol used by the receiving network. When capitalized, the term "Internet" refers to the collection of networks and gateways that use the TCP/IP suite of protocols.

The Internet has become a cultural fixture as a source of both information and entertainment. Many businesses are creating Internet sites as an integral part of their marketing efforts, informing consumers of the products or services offered by the business or providing other information seeking to engender brand loyalty. Many federal, state, and local government agencies are also employing Internet sites for informational purposes, particularly agencies which must interact with virtually all segments of society such as the Internal Revenue Service and secretaries of state. Providing informational guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for

commercial transactions.

Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients effect data transaction using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video, etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup Language (HTML). In addition to basic presentation formatting, HTML allows developers to specify "links" to other Web resources identified by a Uniform Resource Locator (URL). A URL is a special syntax identifier defining a communications path to specific information. Each logical block of information accessible to a client, called a "page" or a "Web page", is identified by a URL. The URL provides a universal, consistent method for finding and accessing this information, not necessarily for the user, but mostly for the user's Web "browser". A browser is a program capable of submitting a request for information identified by an identifier, such as, for example, a URL. A user may enter a domain name through a graphical user interface (GUI) for the browser to access a source of content. The domain name is automatically converted to the Internet Protocol (IP) address by a domain name system (DNS), which is a service that translates the symbolic name entered by the user into an IP address by looking up

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the domain name in a database.

Many businesses wishing to exploit the web for business purposes must implement a network of servers and other components connected to the web to implement the functionality that propels their businesses. However, since the needs of individual businesses vary, providers of these components and services usually do not provide a "one-size-fits-all" web hosting system, but rather supply customized systems to fit the requirements of each of the customers individually. However, since it is customized to the needs of the individual enterprise, creating a complex schematic drawing showing the necessary resources and connections to supply the needs of the customer as well as satisfying the policy and protocol requirements of the provider can be very difficult and time consuming using existing drawing programs. Such a task is difficult for at least two reasons. First, the policy requirements of a provider for connecting various components together properly and the knowledge of which components are necessary can be very difficult for a layperson. Second, the interface for many, if not most, drawing programs are quite complex to use. Therefore, it would be desirable to have a method for creating schematic diagrams for web hosting hardware that is simple to use and less time consuming to use than prior art methods.

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SUMMARY OF THE INVENTION

The present invention provides a method, system, and computer program product for producing a drawing of components and connections needed to implement a desired system, such as, for example, a server farm for web hosting. In one embodiment, the computer program product receives user' needs of the user's desired system. The product then determines the components and connections needed to implement a system that satisfies the user needs and which comply with a set of protocols necessary to ensure that the system performs properly. In one embodiment, the user's needs are gathered through a series of graphical user interfaces. The product then generates drawing program input that provides instructions for producing a drawing of the system that satisfies the user's needs. The drawing program may be, for example, Visio, a product of the Microsoft Corporation of Redmond, Washington. The drawing program input is then sent to the drawing program which then generates a drawing of the desired system.

INVENTION

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the
5 invention are set forth in the appended claims. The
invention itself, however, as well as a preferred mode of
use, further objectives and advantages thereof, will best
be understood by reference to the following detailed
description of an illustrative embodiment when read in
10 conjunction with the accompanying drawings, wherein:

15 **Figure 1** depicts a pictorial representation of a
data processing system in which the present invention may
be implemented in accordance with a preferred embodiment
of the present invention;

20 **Figure 2** depicts a block diagram of a data processing
system in which the present invention may be implemented;

25 **Figure 3** depicts a block diagram of a web hosting
customization tool interfaced with a drawing program
according to the present invention;

30 **Figure 4** depicts a pictorial diagram illustrating an
exemplary drawing program graphical user interface;

35 **Figures 5A-5N** depict pictorial diagrams illustrating
a series of exemplary graphical user interfaces that may
be used by a user to supply the web hosting customization
40 tool with the information necessary to construct a
technical diagram with a drawing program in accordance
with the present invention;

45 **Figure 6** depicts a process flow and program function
illustrating an exemplary procedure for gathering user
50 information regarding user needs and then creating a
server farm design satisfying an enterprise's needs is
depicted in accordance with the present invention;

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Figure 7 depicts an example of a drawing illustrating a server farm design produced using the present invention in conjunction with a drawing program; and

- 5 **Figures 8A-8B** depict an exemplary list of hardware necessary to implement the requirements of a user based on input (not shown) entered by the user into the tool.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular
5 with reference to **Figure 1**, a pictorial representation of
a data processing system in which the present invention
may be implemented is depicted in accordance with a
preferred embodiment of the present invention. A
computer **100** is depicted which includes system unit **102**,
10 video display terminal **104**, keyboard **106**, storage devices
108, which may include floppy drives and other types of
permanent and removable storage media, and mouse **110**.
Additional input devices may be included with personal
computer **100**, such as, for example, a joystick, touchpad,
15 touch screen, trackball, microphone, and the like.
Computer **100** can be implemented using any suitable
computer, such as an IBM RS/6000 computer or
IntelliStation computer, which are products of
International Business Machines Corporation, located in
20 Armonk, New York. Although the depicted representation
shows a computer, other embodiments of the present
invention may be implemented in other types of data
processing systems, such as a network computer. Computer
100 also preferably includes a graphical user interface
25 (GUI) that may be implemented by means of systems
software residing in computer readable media in operation
within computer **100**.

With reference now to **Figure 2**, a block diagram of a
data processing system is shown in which the present
30 invention may be implemented. Data processing system **200**
is an example of a computer, such as computer **100** in

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Figure 1, in which code or instructions implementing the processes of the present invention may be located. Data processing system **200** employs a peripheral component interconnect (PCI) local bus architecture. Although the 5 depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used.

Processor **202** and main memory **204** are connected to PCI local bus **206** through PCI bridge **208**. PCI bridge **208** also 10 may include an integrated memory controller and cache memory for processor **202**. Additional connections to PCI local bus **206** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **210**, small 15 computer system interface SCSI host bus adapter **212**, and expansion bus interface **214** are connected to PCI local bus **206** by direct component connection. In contrast, audio adapter **216**, graphics adapter **218**, and audio/video adapter **219** are connected to PCI local bus **206** by add-in boards 20 inserted into expansion slots. Expansion bus interface **214** provides a connection for a keyboard and mouse adapter **220**, modem **222**, and additional memory **224**. SCSI host bus adapter **212** provides a connection for hard disk drive **226**, tape drive **228**, and CD-ROM drive **230**. Typical PCI local 25 bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **202** and is used to coordinate and provide control of various components within data processing system **200** in **Figure 2**. The 30 operating system may be a commercially available operating system such as Windows 2000, which is available from

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Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provides calls to the operating system from Java programs or applications executing on data processing system 200. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented programming system, and applications or programs are located on storage devices, such as hard disk drive 226, and may be loaded into main memory 204 for execution by processor 202.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 2** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 2**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

For example, data processing system 200, if optionally configured as a network computer, may not include SCSI host bus adapter 212, hard disk drive 226, tape drive 228, and CD-ROM 230, as noted by dotted line 232 in **Figure 2** denoting optional inclusion. In that case, the computer, to be properly called a client computer, must include some type of network communication interface, such as LAN adapter 210, modem 222, or the like. As another example, data processing system 200 may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system 200 comprises some type of network communication interface. As a further

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example, data processing system **200** may be a personal digital assistant (PDA), which is configured with ROM and/or flash ROM to provide non-volatile memory for storing operating system files and/or user-generated
5 data.

The depicted example in **Figure 2** and above-described examples are not meant to imply architectural limitations. For example, data processing system **200** also may be a notebook computer or hand held computer in
10 addition to taking the form of a PDA. Data processing system **200** also may be a kiosk or a Web appliance. The processes of the present invention are performed by processor **202** using computer implemented instructions, which may be located in a memory such as, for example,
15 main memory **204**, memory **224**, or in one or more peripheral devices **226-230**.

The present invention provides a method, system, and computer program product for presenting a simple user interface for constructing diagrams of configuring web
20 hosting networks and other networks that must conform to specified guidelines.

With reference now to **Figure 3**, a block diagram of a web hosting customization tool **310** interfaced with a drawing program **302** is depicted according to the present
25 invention. The drawing program **302**, such as, for example, Visio, a product of Microsoft Corporation of Redmond Washington, includes a drawing program input interface **304**, a drawing program output interface **306**, and drawing functions **308**. Drawing functions **308** provide
30 the functionality of the drawing program to produce figures, lines, and pictures. Drawing program output

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interface **306** provides an interface between the drawing program **302** and an output device, such as, for example, a video display terminal. The drawing program input interface **304** provides a mechanism for the drawing
5 program **302** to receive input commands from a user via, for example, a mouse or keyboard.

However, in the present invention, web hosting customization tool **310** includes an output interface **312** configured to interface with drawing program **302** through
10 drawing program's **302** input interface **304**. Web hosting customization tool **310** in conjunction with drawing program **302** allows a user to create a schematic layout or drawing of servers, routers and other equipment and their connections necessary to implement and host web sites.
15 The drawing produced is sufficient to allow a technician to connect the various electronic devices in a manner to implement a web hosting site and provide the capabilities desired by the user.

Web hosting customization tool **310** allows a user to
20 interact with a simpler interface than that typically provided by a drawing program **302** that allows a user to merely specify the requirements that the particular enterprise needs in order to perform their tasks. This input is received by Graphical user interface (GUI) **314**.
25 A conversion unit **316** includes rules necessary to implement a system fulfilling the requirements specified by the user. For example, in one embodiment, the web hosting customization tool's **310** GUI **314** encapsulates the rules comprising IBM's Mass Custom Policy. The
30 conversion unit **316** thus, takes the user input from GUI **314** and converts the input into output that is formatted

for the drawing program 302. The output interface 312 then communicates the customization tool's 310 output to the input 304 of drawing program 302. The drawing program 302 then produces a drawing conforming to the 5 specifications of the user.

With reference now to **Figure 4**, a pictorial diagram illustrating an exemplary drawing program graphical user interface is depicted. Drawing program graphical user interface (GUI) 400 includes a template palette 402, tool 10 bars 404, and a drawing display 406. The tool bar 404 allows the user to open files, select drawing tools, open various template palettes, as well as other features. The template palette 402 contains various figures and pictures that are commonly used, allowing the user to 15 merely drag and drop a picture rather than having to create the image from scratch. The drawings constructed by the user are displayed in drawing display 406. As can be seen from the picture, constructing complicated drawings using this interface could be quite time 20 consuming and often difficult.

With reference now to **Figures 5A-5N**, pictorial diagrams illustrating a series of exemplary graphical user interfaces that may be used by a user to supply the web hosting customization tool with the information 25 necessary to construct a technical diagram with a drawing program is depicted in accordance with the present invention. In **Figure 5A**, Design type selection GUI 500 allows a user to select the design type, such as whether the user wishes to create a mass custom server farm 30 or open an existing record of a previously started customization. In **Figure 5B**, customer information GUI

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502 provides a user interface allowing a user to enter customer information such as, for example, company name, address, contact, and phone number. Once the user information has been entered, the user is presented with
5 a geographic load balancing GUI 504 as depicted in **Figure 5C** which allows the user to select whether the user wishes to have the server farm located at a single geographic location or at multiple locations.

The user is then presented with a firewalls GUI 506
10 as depicted in **Figure 5D**. Firewalls GUI 506 allows a user to provide the design tool with information such as whether the web layer, data layer and backend layer are shared or dedicated, thus enabling the design tool to select the appropriate firewall design to comply with
15 appropriate standards of server farm hosting. In **Figure 5E**, a connectivity GUI 508 allows a user to select the internet bandwidth of the shared and dedicated environments, the backend connectivity and network speeds desired. The design tool then presents the user with a
20 web servers GUI 510 as depicted in **Figure 5F**, that allows the user to select from a plurality of server platforms, platform details, and quantities. Once the server details have been entered by the user, then the design tool presents the user with an application servers GUI
25 512 as depicted in **Figure 5G**. The application servers GUI 512 allows the user to select the server platform, details, and other information about servers to be used to provide applications to users of the server farm. The user is then finally presented with a database servers
30 GUI 514 as depicted in **Figure 5H** that allows the user to specify information about the servers and quantities desired to be utilized as database servers in the server

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farm.

- Once the server information has been selected, the user is presented with a data backup capacity GUI **516** as depicted in **Figure 5I**. Data backup capacity GUI **516** provides a user interface allowing the user to select the data backup requirements needed by the enterprise that will use the server farm implemented from the server farm design created by the design tool from the choices selected by the user. The user is then presented with a load balancers GUI **518** as depicted in **Figure 5J**. The load balancers GUI **518** allows a user to specify whether a load balancing product is desired and the location of the selected load balancer, if one has been selected. The user then selects the shared environment or dedicated environment template from environment GUI **520** as depicted in **Figure 5K**. The design templates are drawing package drawings, such as Microsoft Visio drawings, which represent and define a base physical and logical network infrastructure and provide the foundation for the Mass Custom Tool. The templates represent the production environment in which a design prescribed with the tool comprises a total solution. The template and the layering of the selected server and network componentry architect a solution which can be built and deployed to meet real business requirements.

Once the environment template has been selected, the user has completed the entering the information that the design tool needs in order to produce a drawing of the desired server farm on a drawing program where the drawing provides the details necessary to implement the system according to the terms of a particular provider of server farm systems policies and protocols, such as, for

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example, the International Business Machine's Mass Custom Policy, which is hereby incorporated herein by reference for all purposes. The user is then presented with a create document GUI 522 as depicted in **Figure 5L** that 5 allows a user to save the record and to complete the drawing. The user may then be presented with a budget and planning estimate 524 as depicted in **Figure 5M** that provides the user with an estimated cost to implement the system meeting the requirements specified by the user.

10 Finally, the user will be presented with a create another GUI 526 as depicted in **Figure 5N** that allows the user to end the session or to create another server farm design.

The GUI's depicted in **Figures 5A-5N** are provided merely as examples of GUI's that may be utilized in 15 allowing a user to specify an enterprise's network computing needs in order that a design of an appropriate network satisfying these needs and satisfying a supplier's policies and protocols may be created. The specific information gathered may vary depending on the 20 policies and protocols of the server farm supplier.

With reference now to **Figure 6**, a process flow and program function illustrating an exemplary procedure for gathering user information regarding user needs and then creating a server farm design satisfying an enterprise's 25 needs is depicted in accordance with the present invention. To begin, the user starts the design tool, such as, for example, web hosting customization tool 310 in **Figure 3**, and logs into the tool (step 601). The tool determines whether the user has entered the correct 30 password (step 602) and if not, prompts the user to log in again (step 601). If the user has entered the correct password, the tool searches for a running copy of a

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drawing program such as, for example, Visio, or starts the drawing program and then hides the drawing program (step **603**). A toolbar is then displayed to the user (step **604**) and the tool awaits the user to select the
5 button to start the information wizard to gather information necessary to produce a server farm design (step **605**). An example, of an information wizard is the series of GUI's presented to a user in one embodiment as depicted in **Figures 5A-5N**. The tool presents various
10 user interfaces and prompts the user for information through the wizard (step **607**) thus gathering the information necessary for the creation of the server farm design.

Once the user finishes the wizard process (step
15 **608**), the tool begins the drawing process and first determines whether the user has selected a shared or dedicated template (step **609**). If the user has selected a shared environment, then the tool open's the shared template (step **610**). If the user has selected a
20 dedicated environment, then the tool opens the dedicated template (step **611**). Once the appropriate template has been opened, the tool then calculates the space requirements needed for the design drawing (step **612**). The tool also adds extra blank pages as needed to allow
25 the design to be completely drawn (step **613**).

Next, the tool creates load balancing hardware and text for input into drawing program (step **614**). The tool then creates server hardware and text for input into drawing program (step **615**) and creates and audit trail
30 text for input to the drawing program (step **616**). The tool then creates other text for input into drawing

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program (step 617) and appends backend network page for input into drawing program (step 618). The tool then appends client-safe page with proprietary information removed for input into drawing program (step 619) and 5 created connection input for the drawing program (step 620). The connection input data is used to instruct the drawing program how to draw connections for the various servers and other components that are drawn. The tool then sends all of the input to the drawing program (step 10 621), which then creates a drawing based on the input received from the tool. The tool then unloads and the drawing program is revealed to display the drawing (step 622).

An example of a drawing illustrating a server farm 15 design produced using the present invention in conjunction with a drawing program is depicted in **Figure 7**. As can be seen from observing **Figure 7**, diagrams of resources and connections necessary to implement a server farm are complex and detailed. Producing such a figure 20 using a drawing package, such as depicted in **Figure 4**, could be quite time consuming and difficult, especially for persons not familiar and comfortable with a drawing program. However, the present invention eliminates the need for a user to learn how to use a drawing program and 25 also reduces the time to create a diagram such as depicted in **Figure 7** by providing a series of graphical user interfaces that allow a user to quickly select the requirements desired and then using policy and protocol requirements for a supplier's products to determine the 30 products and connections needed to implement the user's desires. A set of inputs for a drawing program are then created by the tool based on the user's needs and the

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supplier's protocols to supply to a drawing program. The drawing program then creates a drawing illustrating the components and connections necessary to satisfy the user's needs. Thus, the present invention reduces the 5 time and simplifies the knowledge required to produce a solution diagram for a server farm or web hosting site for e-business enterprises.

Figures 8A-8B depict an exemplary list of hardware necessary to implement the requirements of a user based 10 on input (not shown) entered by the user into the tool. It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present 15 invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of 20 computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, 25 for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been 30 presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and

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variations will be apparent to those of ordinary skill in
the art. The embodiment was chosen and described in
order to best explain the principles of the invention,
the practical application, and to enable others of
5 ordinary skill in the art to understand the invention for
various embodiments with various modifications as are
suited to the particular use contemplated.

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